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Transportation

Volume 1
Travel Characteristics in the Halifax Region

Discussion Paper
Number 6

City of Halifax

Planning Department

TRAVEL CHARACTERISTICS IN THE HALIFAX REGION

MUNICIPAL DEVELOPMENT PLAN REVIEW
DISCUSSION PAPER NUMBER 6

Prepared by:
City of Halifax
Planning Department
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This report is the sixth in a series of discussion papers being prepared for the review of the municipal planning strategy by the City.

It was prepared by Kim D. McNutt of the Planning Department under the supervision of Simpson McLeod, Senior Planner.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF MAPS	iii
LIST OF FIGURES	iii
EXECUTIVE SUMMARY	iv
INTRODUCTION	1
HOUSEHOLD TRAVEL CHARACTERISTICS: CITY OF HALIFAX AND REGION	1
Traffic Flows	2
Trip Purpose	8
Time of Trip	11
CONCLUSIONS	16

LIST OF TABLES

		Page
1.	Origins of Person-Trips Destined for Halifax Planning Areas, 1981	7
2.	Halifax Region Origin-Destination Matrix, 1981	9
3.	Trip Purpose by Planning Area, City of Halifax, 1981	11
4.	Trip Purpose, Halifax Region, 1981	12
5.	Time of Trip, Halifax Region, 1981	14

LIST OF MAPS

1.	Halifax Region Traffic Sub-Areas	5

LIST OF FIGURES

1.	Traffic Flows by Area (Number of Person-Trips) Halifax Region, 1981	3
2.	Trip Purpose (Trips Destined to Specific Areas) City of Halifax, 1981	10
3.	Time of Trip (Trips Destined to Specific Areas) City of Halifax, 1981	13

EXECUTIVE SUMMARY

This paper examines travel characteristics in the Halifax region, primarily as background information necessary to evaluate transportation policy in the City of Halifax, and also makes some general recommendations based on these data.

The subject matter of this discussion paper is:

- regional traffic flow,
- trip purpose, and
- time of trip.

The City of Halifax occupies a pivotal position in the regional transportation network with two-thirds of trips made by individuals in the region traversing the City. Peninsula Halifax, because of its large population and diverse range of land uses, is the most significant node in the network, involving 58 percent of the regional traffic flow. Other areas of Halifax (Mainland North, Mainland South, and the Central Business District area) with smaller populations and more specialized residential and commercial land uses involve much lower portions of the regional traffic flows. The heaviest traffic flows in the region are between Peninsula Halifax and Dartmouth and between the Peninsula and Mainland areas of the City. There is also a significant number of trips within each area, accentuating not only the importance of traffic links between the Peninsula and other areas of the region, but also internal linkages within the City. On a City-wide basis, 82 percent of trips ending in Halifax begin in the City.

The volume of trips is about evenly divided between work-related trips and trips made for shopping or personal purposes. Of trips destined to the Peninsula, about 40 percent are shopping/personal trips and 37 percent work-trips. The Central Business District area has a high proportion of work trips (58 percent). Work-related trips are generally concentrated in the morning and afternoon peak periods, while shopping and personal trips occur throughout the day

and evening. This combination of trip purpose and time of day emphasize that transportation is an important factor, especially on the Peninsula, all day long. CBD access is of critical importance primarily during peak periods. Congestion cannot be eliminated, but should be controlled to reduce social and energy costs.

General recommendations have been made based on the data presented in this report. These recommendations call for:

- the recognition of the importance of the City of Halifax and particularly the Peninsula access issue in regional transportation policies and programs;

- the maintenance of safe and convenient traffic links between local destinations;

- the maximization of accessiblity from home to work and to business and community facilities;

- the extension of the practice of staggered work hours or other such innovations to reduce the effects of peaking in the morning and afternoon; and

- the investigation of options for the reduction of peak flows, such as slowing the rate of employment centralization or increasing the availability of housing in the inner areas of the City.

INTRODUCTION

This report is the sixth discussion paper of the Municipal Development Plan Review and the first of a transportation series. It provides background information on travel characteristics in the Halifax region. Subsequent papers in the transportation series will examine public transit, and the street system.

The series provides a basis for the review of Policy Set 8 (Transportation) of the municipal planning strategy in light of recent developments and trends in the City. It inventories existing facilities, services, and trip generation data in the City and the region, identifying possible problem areas. The papers concentrate on those subjects most relevant to municipal jurisdiction.

The series contains recommendations to enable various transportation elements to be considered by the Municipal Services Subcommittee of the Municipal Development Plan Review Committee.

HOUSEHOLD TRAVEL CHARACTERISTICS: CITY OF HALIFAX AND REGION

The City of Halifax and its region is the largest urban centre in Atlantic Canada. With 34 percent of Nova Scotia's population, the Halifax metropolitan area is the population, employment, service, government and transportation focus of the province. The City of Halifax is the heart of the metropolitan area, containing 41 percent of the population and 62 percent of the jobs.[1] Although individual municipalities are understandably concerned with transportation impacts in their own jurisdictions, transportation

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1 City of Halifax Planning Department, The Regional Context of the City of Halifax Economy, Municipal Development Plan Review Discussion Paper #1, 1983, p. 3.

cannot be viewed exclusively in terms of the individual municipality. It is, rather, a regional issue with regional implications. Municipal transportation policy must therefore consider events and patterns outside municipal boundaries. An understanding of regional transportation patterns and the role the City of Halifax plays in the regional pattern should form the basis for a more effective transportation policy.

Traffic Flows

According to a 1981 survey, there were 432,867 person-trips[2] made daily in the Halifax region in 1981 (not including walk or walk-ferry trips)[3]. This figure represents the total number of people who both began and ended a trip in the Halifax region; however, the route of the trip was not taken into consideration. To gain an idea of the number of trips affecting any given area within the region, traffic flows are assigned to their points of origin and destination and to areas they would most likely pass through enroute (see Figure 1). A figure of 487,523 person-trips results when the traffic flows of all areas are summed in this way.

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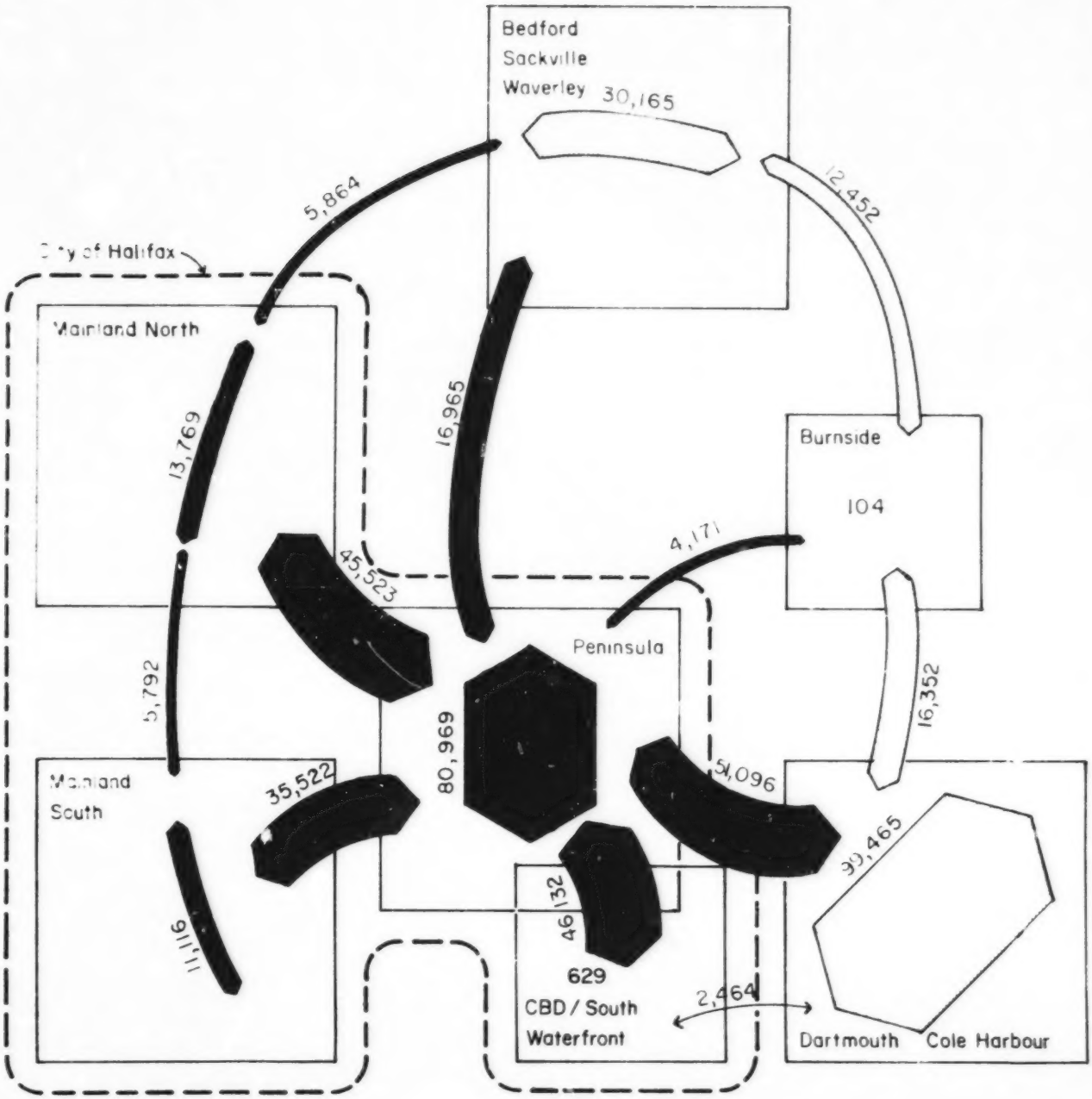
[2] A person-trip is defined as one person making one trip. For example, two persons in a car account for two person-trips. As well, one person in a car which makes an intermediate stop accounts for two person-trips. Figures supplied by Operations Planning Group of Metropolitan Area Planning Commission from 1981 data.

[3] The compilation of regional transportation characteristics is an important task of the Metropolitan Area Planning Commission (MAPC) and its Operations Planning Group. The major source of regional transportation characteristics is the MAPC trip file, compiled in the spring of 1981 from a 12 percent sample survey of households in the Halifax metropolitan area. Information available includes an origin-destination matrix which shows the beginning and end points of all person-trips in the region, the mode by which trips were made, the purpose of trips, and the time of day that trips were made. Two limitations of the survey are that it only includes trips made by individuals in private households (i.e., it excludes commercial traffic) and it only accounts for those trips that have both an origin and destination point within the defined Halifax region. (The MAPC Halifax region is shown on Map 1).

Figure 1 :
Traffic Flows by Area (Number of Person Trips) Halifax Region , 1981



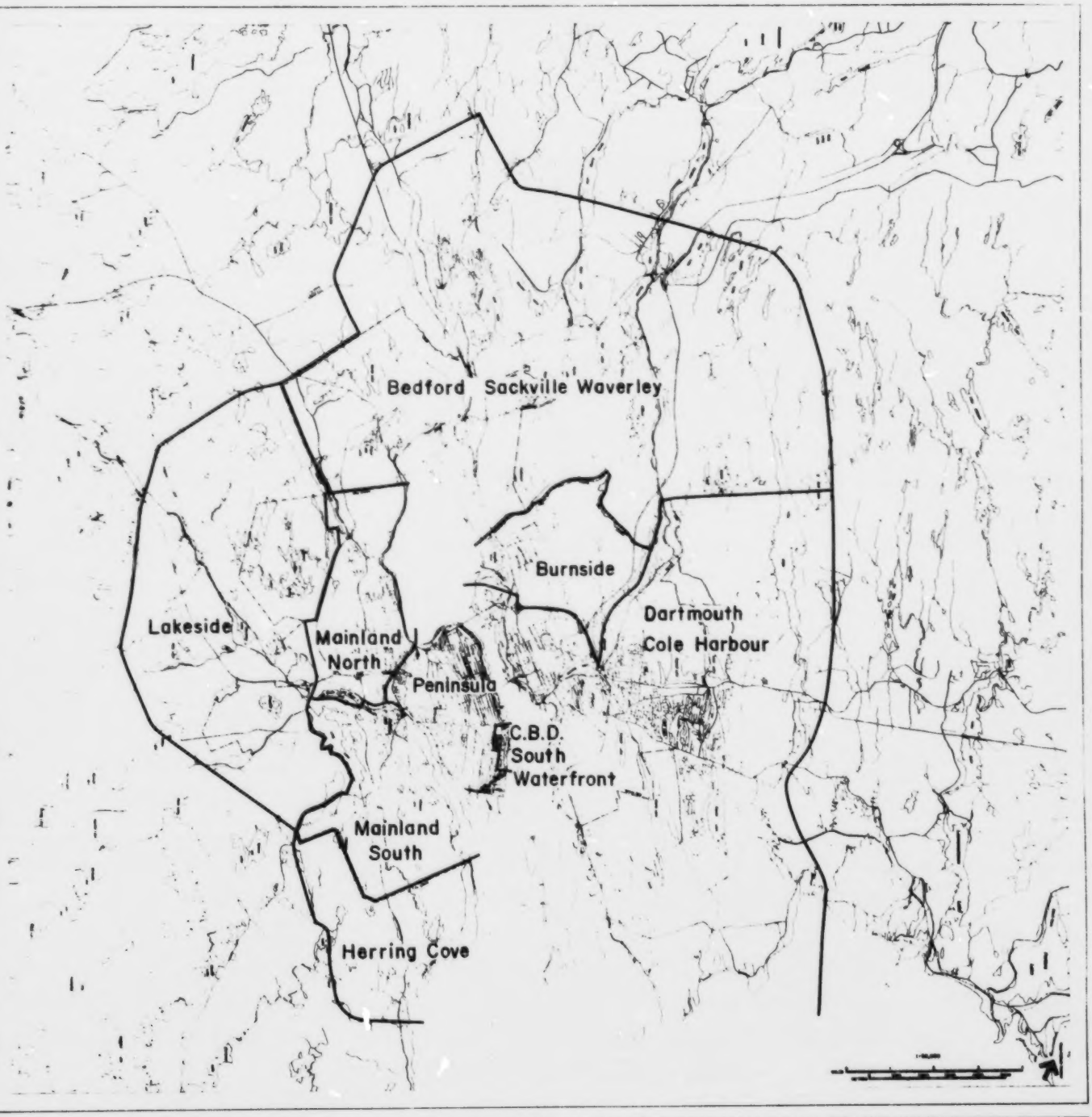
Source M A P C Operations Planning Group Trip File , 1981

Overall, at least 67 percent of the region's traffic flow has either an origin, or destination, or passes through the City of Halifax (326,966 out of 487,523 total person-trips comprising the regional traffic flow.) Peninsula Halifax involves the greatest proportion of the regional traffic flow (58 percent). By comparison, Mainland North involves 15 percent of the regional person-trips, Mainland South 12 percent, and the CBD/South Waterfront 10 percent. (See Map 1 for definition of City of Halifax traffic areas).

Figure 1 shows the volume of person-trips between broad areas of the Halifax region in a typical 24-hour period. The greatest traffic flows are between Dartmouth and Peninsula Halifax, Peninsula Halifax and CBD/South Waterfront, Mainland North and Peninsula Halifax, and between Mainland South and Peninsula Halifax. Peninsula Halifax is obviously the pivotal element in the regional transportation network - most trips either start, finish or pass through the Peninsula.

There are a number of reasons why Peninsula Halifax is the key element in the regional transportation system. It is the historical centre of the region and still retains a high proportion of the region's urban activities. The CBD/South Waterfront, as the business and government core of the region, is a major attraction. Geography has made access a problem: there are only three mainland and two harbour bridge access points to the Peninsula. All trips destined to the downtown (except ferry trips) must pass through the Peninsula. As well, all trips between Mainland North and Mainland South to and from Burnside, Dartmouth and Cole Harbour normally pass through the Peninsula.

Not only are geographic configuration and the location of downtown Halifax prime reasons for high traffic flows in the Peninsula, other factors also reinforce its importance in the regional transportation system. The Peninsula is the largest residential area in the City and contains many commercial and employment destinations such as



Halifax Region Traffic Sub-Areas

Map 1

Based on traffic zone boundaries defined by Operations Planning Group of Metropolitan Authority.

shopping centres, hospitals, universities, port functions, the defence establishment and other government and institutional uses. This mix of land uses generates a large traffic flow, from both outside and within the Peninsula.

Mainland North and Mainland South as residential areas do not have many trip attractors. Trips in these two areas are oriented primarily to the Peninsula and CBD/South Waterfront. There is also a strong linkage between the primarily residential areas of Dartmouth, Cole Harbour, Bedford, Sackville, and Waverley to the Peninsula and the CBD/South Waterfront, although Dartmouth, too, possesses many commercial and employment attractions.

While 67 percent of the regional traffic flows either begin, end or pass through the City of Halifax, only 55 percent of regional person-trips begin or end in Halifax (238,664 out of 432,867 person trips); the remaining 45 percent do not have any base in the City. These trips originate in or are destined for such areas as Dartmouth, Cole Harbour, Bedford, Sackville, Waverley, Lakeside, or Herring Cove.

Of all trips that end in the City of Halifax, 82 percent originate inside the City (see Table 1); the other 18 percent originate outside the City boundary. However, approximately 80,000 commercial vehicle trips per day and 70,000 externally based trips are not included in the MAPC study.

Each area of the City shows a distinctive distribution of trip origins. The CBD/South Waterfront has the largest percentage of trip origins from outside the City, as it is a regional employment centre, while other areas of the City which are more residential in nature show smaller proportions of trip origins from outside the City.

TABLE 1: ORIGINS OF PERSON-TRIPS DESTINED FOR HALIFAX PLANNING AREAS, 1981

	ORIGIN							
	Internal		External to Area But Inside City of Halifax		External to City of Halifax		Total	
Destination	Number	Percent	Number	Percent	Number	Percent	Number	Percent
CBD/South Waterfront	629	2.6	15,708	65.9	7,508	31.5	23,845	100.0
Peninsula Halifax	80,969	55.7	38,271	26.3	26,174	18.0	145,414	100.0
TOTAL PENINSULA	81,598	48.2	53,979	28.3	33,682	19.9	169,259	100.0
Mainland North	13,769	34.4	20,754	51.9	5,472	13.7	39,995	100.0
Mainland South	11,116	37.8	15,299	52.0	2,995	10.2	29,410	100.0
TOTAL CITY OF HALIFAX	106,483	44.6	90,032	37.7	42,149	17.7	238,664	100.0

SOURCE: Metropolitan Area Planning Commission, Operations Planning Group, Trip File, 1981.

Table 2 shows the number of person-trips for each area in the Halifax region by origin and destination. These figures highlight the importance of the links between Dartmouth and Peninsula Halifax (i.e., the two harbour bridges and the ferry) and between the Peninsula and Mainland portions of the City.

Trip Purpose

The 1981 MAPC trip file uses five categories of trip purposes: "home-based work", "home-based shopping", "home-based school", "home-based other", and "non-home based". The "home-based other" category includes such trips as recreation, leisure, service, and appointments. For the purposes of this analysis, home-based shopping and other trips have been combined. Non-home based trips refer to trips where home is not one of the trip ends - for example, running an errand from the place of employment with the family car at lunch time.

Of all trips destined to Halifax in a 24-hour period (238,664 not including walk trips), the most frequent trip purpose was the home-based shopping and other category (40 percent) followed closely by home-based work trips (37 percent). Non-home based trips (12 per-ent) and home-based school trips (11 percent) were less important. In general, the more residential the area of Halifax, the more important are shopping and other trips. The CBD/South Waterfront on the other hand, is heavily oriented to work trips (see Figure 2). Table 3 breaks down trip purpose by planning area and Table 4 show regional trip purpose data.

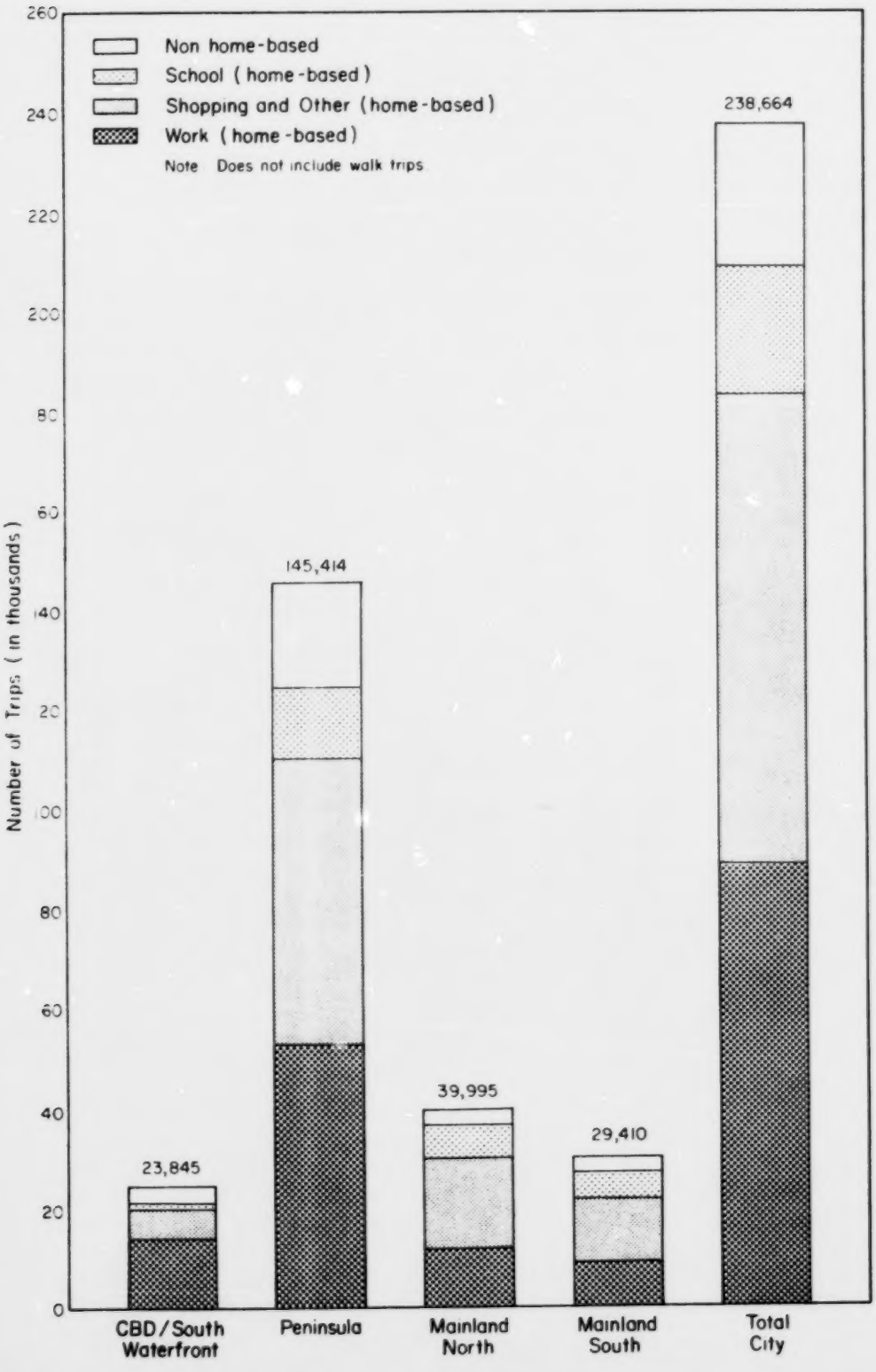
Work trips form a significant portion of all trips destined to the CBD/South Waterfront, whereas in other areas of the City this is less so. Peninsula Halifax has a relatively equal distribution of work and shopping/other trips - 37 and 40 percent respectively.

TABLE 2: HALIFAX REGION ORIGIN-DESTINATION MATRIX, 1981

Originating Traffic Area	Destination: CBD/South Waterfront	Peninsula	Mainland North	Mainland South	Burnside	Dartmouth/ Cole Harb.	Bed./Sack/ Waverley	Herr.Cove/ Lakeside	Total
CBD/South Waterfront	629	10,108	3,164	2,154	79	5,225	1,735	451	23,545
Peninsula	10,375	80,969	15,967	11,528	900	17,163	6,817	1,514	145,233
Mainland North	3,053	16,349	13,769	1,618	768	2,727	1,862	133	40,280
Mainland South	2,280	11,814	1,624	11,116	260	1,317	725	667	29,803
Burnside	74	995	705	242	104	3,002	1,117	74	6,313
Dartmouth/ Cole Harbour	5,322	17,040	2,790	1,360	3,139	99,465	5,007	296	134,418
Bedford/ Sackville/ Waverley	1,711	6,702	1,781	749	1,124	5,204	30,165	346	47,782
Herring Cove/ Lakeside	401	1,437	196	644	74	320	401	2,019	5,492
TOTAL	23,845	145,414	39,995	29,410	6,449	134,424	47,830	5,500	432,867

SOURCE: Metropolitan Area Planning Commission, Operations Planning Group Trip File, 1981.

Figure 2
Trip Purpose (Trips Destined to Specific Areas). City of Halifax, 1981



Source M A P C., Operations Planning Group Trip File, 1981

TABLE 3: TRIP PURPOSE BY PLANNING AREAS, CITY OF HALIFAX, 1981

Destination	Home Based			Non-Home Based
	Work (Percent)	School (Percent)	Shopping & Other (Percent)	(Percent)
CBD/South Waterfront	58.0	1.4	25.9	14.7
Peninsula	36.6	9.4	39.7	14.3
Mainland North	30.7	16.3	45.7	7.3
Mainland South	32.1	17.7	43.1	7.2
TOTAL CITY	37.2	10.8	39.8	12.3

SOURCE: Metropolitan Area Planning Commission, Operations Planning Group Trip File, 1981.

Time of Trip

Time of trip refers to the time of day a trip was made. For the purposes of this study, the 24-hour day was divided into 5 time periods:

NIGHT - 12:00 MIDNIGHT - 6:59 a.m.
MORNING PEAK - 7:00 - 8:59 a.m.
MID-DAY - 9:00 a.m. - 3:59 p.m.
AFTERNOON PEAK - 4:00 - 5:59 p.m.
EVENING - 6:00 - 11:59 p.m.

The busiest time of day for trip-making in the City was the mid-day period (see Figure 3). However, the mid-day period is seven hours in duration. The much shorter morning and afternoon peaks (2 hours each) account for a disproportionate share of trips. The morning peak includes slightly more trips than the afternoon peak as some commuters tend to delay the trip home until evening for various reasons.

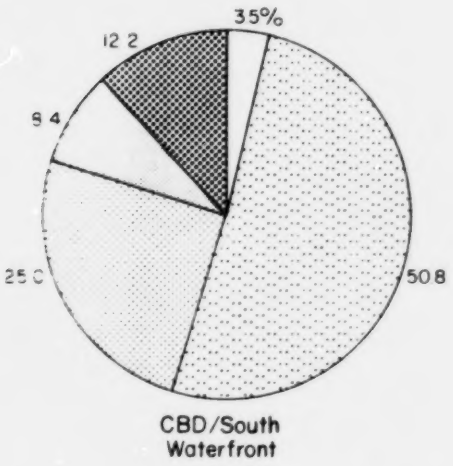
The CBD/South Waterfront exhibits a heavy orientation to morning peak trips. Peninsula Halifax has a mid-day peak as the most travelled trip period, followed by the morning peak because the Peninsula has a range of land uses that generate trips all day long. The two Mainland areas have almost equal mid-day and afternoon peak percentages, attributable to their characteristic residential environments (see Table 5 for regional breakdown of time of trip).

TABLE 4: TRIP PURPOSE, HALIFAX REGION, 1981

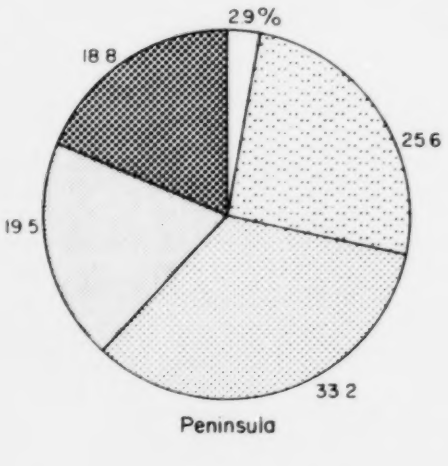
Destination	Home-Based Work	Percent	Home-Based School	Percent	Home-Based Shopping	Percent	Non-Home Based	Percent	Total	Percent
CBD/South Waterfront	13,832	58.0	332	1.4	6,174	25.9	3,507	14.7	23,845	100.0
Peninsula	53,212	36.6	13,693	9.4	57,743	39.7	20,764	14.3	145,414	100.0
Total Peninsula	67,044	39.6	14,025	8.3	63,917	37.8	24,271	14.3	169,259	100.0
Mainland North	12,260	30.7	6,527	16.3	18,296	45.7	2,911	7.3	39,995	100.0
Mainland South	9,432	32.1	5,209	17.7	12,663	43.1	2,106	7.2	29,410	100.0
CITY TOTAL	88,736	37.2	25,761	10.8	94,876	39.8	29,288	12.3	238,664	100.0
Burnside	4,691	72.7	88	1.4	882	13.7	788	12.2	6,449	100.0
Dartmouth/ Cole Harbour	42,190	31.4	17,079	12.7	62,287	46.3	12,866	9.6	134,424	100.0
Bedford/ Sackville/ Waverley	13,916	29.1	9,144	19.1	21,395	44.7	3,376	7.1	47,830	100.0
Herring Cove/ Lakeside	2,188	39.8	1,563	28.4	1,530	27.8	219	4.0	5,500	100.0
TOTAL	151,721	35.1	53,637	12.4	180,970	41.8	46,538	10.8	432,867	100.0

SOURCE: Metropolitan Area Planning Commission, Operations Planning Group Trip File, 1981.

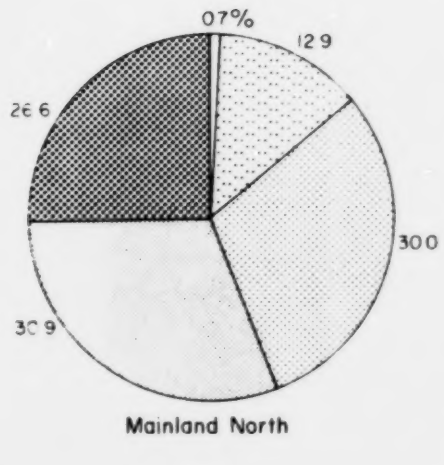
Figure 3
Time of Trip (Trips Destined to Specific Areas), City of Halifax, 1981



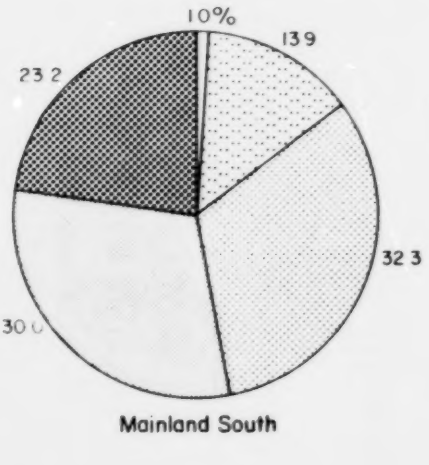
CBD/South Waterfront



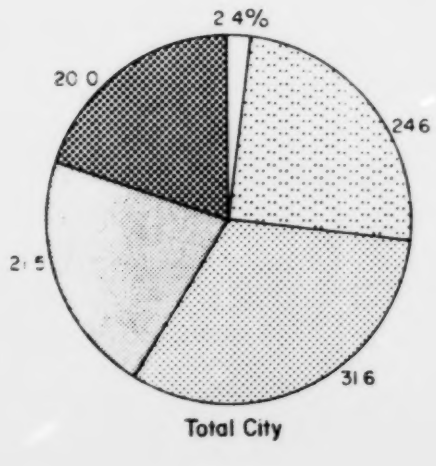
Peninsula



Mainland North



Mainland South



Total City

	Night:	12:00 AM - 6:59 AM
	A.M. Peak	7:00 AM - 8:59 AM
	Mid-Day	9:00 AM - 3:59 PM
	P.M. Peak	4:00 PM - 5:59 PM
	Evening:	6:00 PM - 11:59 PM

Note: Does not include walk trips.

Source: M.A.P.C., Operations Planning Group Trip File, 1981

TABLE 5: TIME OF TRIP, HALIFAX REGION, 1981

Destination	Time Period: Night	Percent	Morning Peak	Percent	Mid-Day	Percent	Afternoon Peak	Percent	Evening	Percent	Total	Percent
CBD/South Waterfront	847	3.5	12,123	50.8	5,970	25.0	1,995	8.4	2,910	12.2	23,845	100.0
Peninsula	4,216	2.9	37,241	25.6	48,274	33.2	28,311	19.5	27,370	18.8	145,414	100.0
Total Peninsula	5,063	3.0	49,364	29.2	54,244	32.0	30,306	17.9	30,280	17.9	169,259	100.0
Mainland North	261	0.7	5,142	12.9	11,592	30.0	12,368	30.9	10,632	26.6	39,995	100.0
Mainland South	287	1.0	4,093	13.9	9,507	32.3	8,699	30.0	6,824	23.2	29,410	100.0
CITY TOTAL	5,611	2.4	58,599	24.6	75,343	31.6	51,373	21.5	47,736	20.0	238,664	100.0
Burnside	604	9.3	3,800	58.9	1,174	18.2	352	5.5	519	8.0	6,449	100.0
Dartmouth/ Cole Harbour	2,602	1.9	22,926	17.1	42,130	31.3	32,321	24.0	34,443	25.6	134,424	100.0
Bedford/ Sackville/ Waverley	780	1.6	8,266	17.3	14,541	30.4	11,810	24.7	12,432	26.0	47,830	100.0
Herring Cove/ Lakeside	56	1.0	1,299	23.6	1,563	28.4	1,694	30.8	887	16.1	5,500	100.0
TOTAL	9,563	2.2	94,893	21.9	134,752	31.1	97,552	22.5	96,018	22.2	432,867	100.0

SOURCE: Metropolitan Area Planning Commission, Operations Planning Group Trip File, 1981.

Major land-use planning issues arise when an attempt is made to define the negative impacts of traffic peaking. Congestion is most prevalent at morning and afternoon peak times. To reduce congestion, one can either increase road capacity or adopt alternatives to avoid costly capital investment in traffic improvements. Alternatives such as the adoption of staggered work hours, traffic management schemes and increased use of transit can alleviate congestion. Wider issues such as providing more housing in the inner city or creating employment nodes throughout the City can also be investigated. However, it should be noted that some level of congestion is bound to occur in some parts of the transportation system at some time of the day. If not, then the system is overdesigned for normal usage, which is wasteful of resources. Furthermore, congestion is a relative term and the levels experienced in Halifax are far lower than those experienced in other large metropolitan centres subject to expansion or growth. While the City should take steps to minimize congestion, it will never eliminate it and provided it is kept within reasonable limits, it will not adversely affect the City's growth potential or reduce its image as a desirable place to live and work.

CONCLUSIONS

The City of Halifax is the pivotal element in the regional transportation network with two-thirds of the regional traffic flow traversing the City. Peninsula Halifax is the key to this network due to its central location and wide range of land use.

> **Regional transportation policies and programs should recognize the central importance of the City of Halifax as a major element in the regional transportation network, and in particular, Peninsula Halifax should be regarded as the critical element in regional transportation strategies.**

While external linkages between the different parts of the Halifax region are important, internal trips within each area are prominent as evidenced by the large number of internal trips within Peninsula Halifax and the City of Dartmouth for example.

> **In addressing regional transportation concerns, attention should be paid to the maintenance of safe and convenient traffic links between local destinations.**

On a City-wide basis, shopping and related trips are slightly more numerous than work trips. However, work trips are very important in the CBD. It is important to emphasize the purpose for which trips are made.

> **A transportation network which maximizes the accessibility from home to work and to business and community facilities should be encouraged. In particular, downtown-related transportation links should emphasize the journey-to-work and links within predominantly residential areas should emphasize local needs.**

There are a number of land-use planning options which can reduce the impacts of traffic peaking. One can either increase road capacity or investigate alternatives to avoid expensive capital investment in traffic improvements. Among these alternatives are the adoption of staggered work hours, the increased use of public transit, the provision of additional housing near the Central Business District, or the creation of employment nodes outside the CBD.

Trip-making occurs throughout the day in the City, but two peaks appear, one in the morning, and one in the afternoon, primarily because of work-related trips.

The City should continue to encourage individuals, institutions, and businesses to extend the practice of staggered work hours or other innovations in work times to reduce peaking in the morning and afternoon peak periods.

The City should continue its policy emphasizing the use of public transit.

The City should also investigate other alternatives to reduce the impacts of traffic peaking such as the relative merits of increasing residential opportunities in the inner City and creating employment nodes within the City outside the CBD.